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(54) **Arrangement for permitting vehicle foot pedal retraction, and vehicle incorporating same**

(57) An arrangement (1) is provided for permitting retraction of a vehicle foot pedal, operable on a push rod, in a frontal crash of sufficient magnitude, in which arrangement the push rod (11) is of low ductability material, having a zone of weakness; a rotary member (6) is attached to, and mounted on the blade (2) for free rotation about a pivot (7), by which rotary member the blade (2) is operationally coupled to the push rod; and displacement means (16) is provided to cause partial rotation of the rotary member (6) upon a frontal impact of sufficient magnitude, to apply a bending moment to the push rod to snap the push rod (11) at its zone of weakness (W), thereby disconnecting the push rod (11) from the blade (2) to permit free blade/pedal movement, and hence to permit retraction away from the feet of the driver.

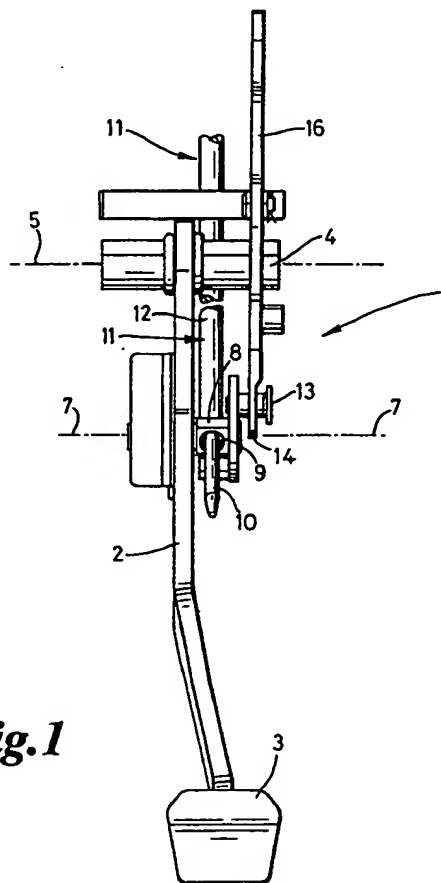


Fig.1

Description

Field of the Invention

[0001] This invention relates in a first aspect to an arrangement for permitting retraction of the foot pedal of a vehicle away from the driver in a crash situation, and whilst the device would normally be effective on the brake pedal, the principles described could be applied to any other pedals (clutch pedal and the accelerator pedal), and in a second aspect to a vehicle incorporating such device.

Background of the Invention

[0002] Some proposals for such devices operate on the principle of displacing the pivot axes of the brake pedal, cf GB 2279625, EP 0757946, EP 0788931. Other proposals release the pedal pivot from its support, cf EP 085079. Yet other proposals are described in EP 0810124, EP 0827885, EP 0836968. In WO 97/06036, is described a proposal for bending the booster push rod to permit pedal retraction, but with whatever system or device is employed, a vital requirement is that the device can never interfere with the normal operation of the braking system.

Object of the Invention

[0003] A basic object of the invention is the provision of an improved arrangement for permitting vehicle foot pedal retraction, and a vehicle incorporating same.

Summary of a First Aspect of the Invention

[0004] According to a first aspect of the present invention there is provided an arrangement for permitting retraction of a vehicle foot pedal, operable on a push rod, in a frontal crash of sufficient magnitude, characterised in that:

- (i) the push rod is of low ductability material, having a zone of weakness;
- (ii) a rotary member is attached to, and mounted on a blade of the pedal for free rotation about the pivot, by which rotary member the pedal is operationally coupled to the push rod; and
- (iii) displacement means is provided to cause partial rotation of the rotary member upon a frontal impact of sufficient magnitude, to apply a bending moment to the push rod to snap the push rod at its zone of weakness, thereby disconnecting the push rod from the pedal to permit free pedal movement, and hence to permit pedal retraction away from the feet of the driver.

Summary of a Second Aspect of the Invention

[0005] According to a second aspect of the invention, there is provided a motor vehicle comprising an arrangement in accordance with the first aspect.

Advantage(s) of the Invention

[0006] As the push rod is of relatively short length and is, in service, subjected only to compressive loadings, there is no operational disadvantage in it being produced in a low grade, low ductability, material satisfactory for the intended duty. Consequently, when a relatively low level bending moment is applied to the push rod by the rotary member, the push rod readily snaps at its zone of weakness, and fracture of the push rod instantly de-couples the latter from the foot pedal, thereby freeing the foot pedal from the constraint on movement in the retraction direction away from the driver that is otherwise present due to the connections to the push rod, thereby permitting the pedal to be retracted, by rotation about its conventional pivot, away from the feet etc of the driver.

Preferred or Optional Features

[0007] The push rod comprises a main length of a first diameter, and an integral, second length of reduced diameter, with the zone of weakness provided at the transition between the two diameters.

[0008] Both the main length, and the second length, are of circular section.

[0009] The rotary member has a through hole through which the reduced diameter length of the push rod may pass.

[0010] The through hole of the rotary member is a circular hole.

[0011] In a first embodiment, the rotary member is rotated, by positional displacement of a component mass (such as a front engine/transmission package) that, in a frontal crash situation of sufficient magnitude, is subject to relatively rearwards movement of sufficient distance.

[0012] In a second embodiment, the rotary member is rotated, in a frontal crash situation of sufficient magnitude, as a result of a component engaging the conventionally provided cross-vehicle beam.

Brief Description of the Drawings

[0013] One embodiment of an arrangement for permitting vehicle foot pedal retraction is shown in the accompanying drawings, in which:

Figure 1 is a front elevation;

Figure 2 is a side elevation;

Figure 2a corresponds to Figure 2 but shows the positions of the various components in a crash sit-

uation.

Figure 3 is a front perspective view to one side; and Figure 4 corresponds to Figure 3 but is from the other side and to a slightly enlarged scale.

Detailed Description of the Drawings

[0014] In the drawings is illustrated an arrangement 1 for permitting retraction of a vehicle foot pedal and specifically a brake pedal blade 2, in the event of a vehicle in which the arrangement 1 is installed, being engaged in a frontal crash situation of sufficient magnitude.

[0015] The blade 2 is provided at one end with a foot pad 3 and is attached at its other end to a transverse tube 4 rotatably mounted on a pivot pin (not shown) supported across side walls of a pedal box (not shown) for pivotal movement about axis 5.

[0016] Intermediate its ends, the blade 2 carries a rotary member 6 which is freely rotatable about an axis 7. The rotary member 6 has a through hole 9 such that a reduced diameter length 10 of a reciprocable brake booster push rod 11 may pass through the hole 9, but a larger diameter length 12 may not, the change of diameter providing a zone of weakness W.

[0017] A headed pin 13 projects laterally from one side of a radius arm 14 connected to the rotary member 6 and engages an arcuate slot 15 in an element 16 that is normally in a fixed position, but is displaceable upon a frontal impact of sufficient magnitude. The length of the slot 15 is such that, in a non-crash situation the slot 15 has no effect on the normal pivotal movement of the blade 2, and reciprocal movement of the push rod 11.

[0018] However, upon a frontal crash situation producing sufficient deformation, the headed pin 13 firstly engages one end of the slot 15 and upon continued deformation the element 16 rotates the rotary member 6 via the radius arm 14, until the brake booster rod 11 snaps at its zone of weakness W, which is its point of transition between reduced diameter portion 10 and larger diameter portion 11, thereby disconnecting the blade 2 from the brake booster, so that the blade 2 is free to rotate away from the feet, or lower legs, of the driver.

Claims

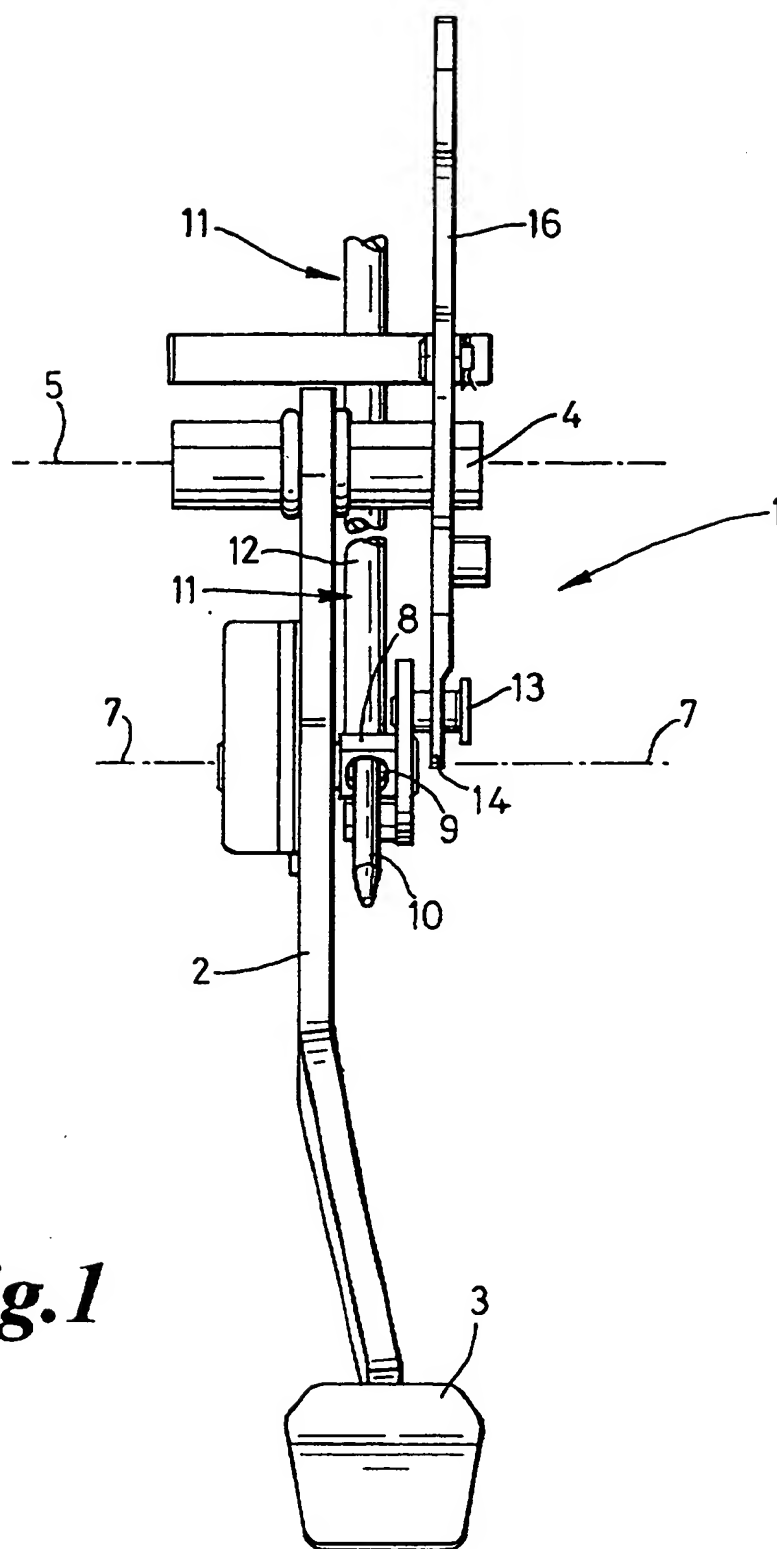
1. An arrangement for permitting retraction of a vehicle foot pedal, operable on a push rod, in a frontal crash of sufficient magnitude, **characterised in that:**

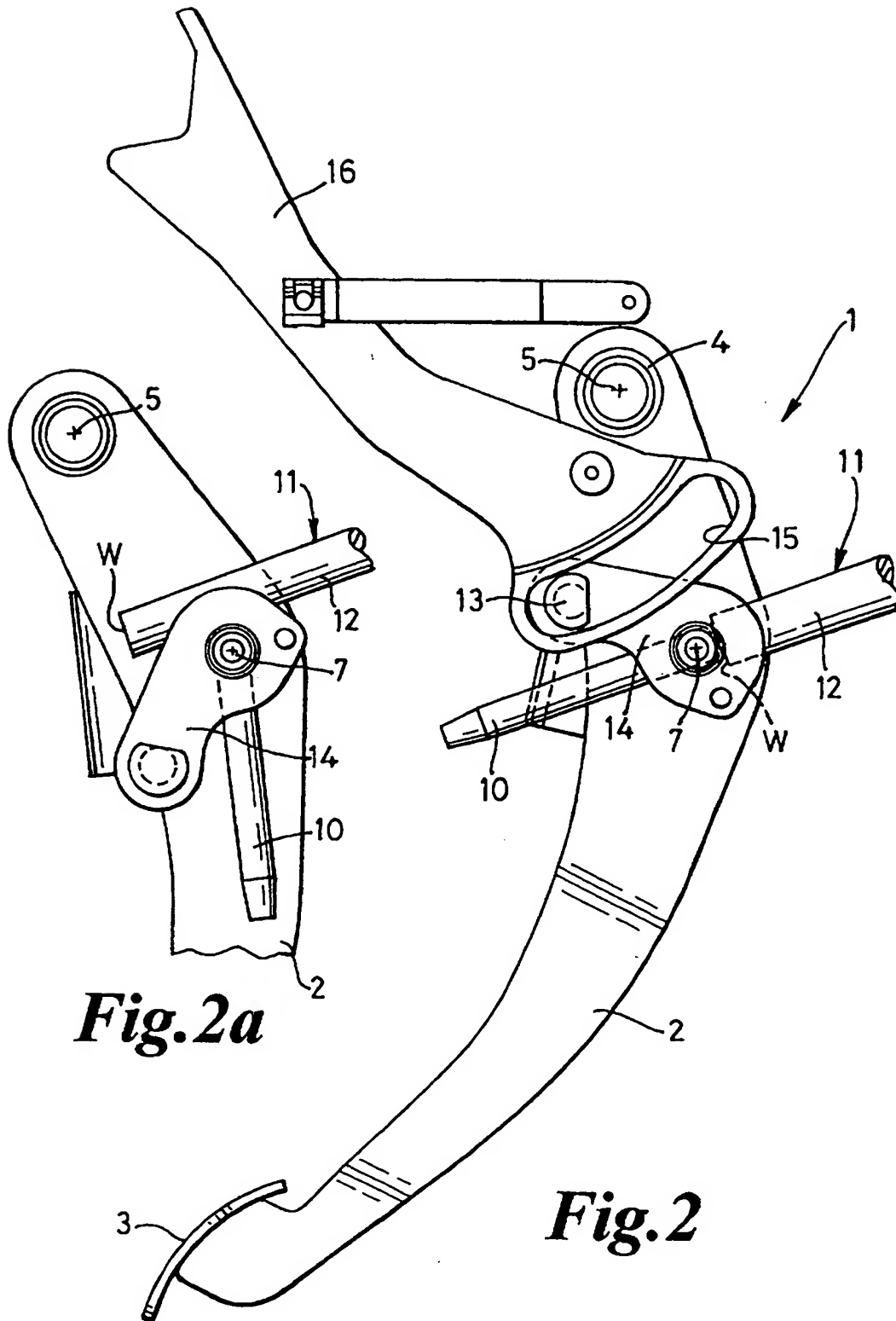
- (i) the push rod (11) is of low ductability material, having a zone of weakness (W);
- (ii) a rotary member (6) is attached to, and mounted on a blade (2) of the pedal for free rotation about pivot (7), by which rotary member (14) the blade (2) is operationally coupled to the

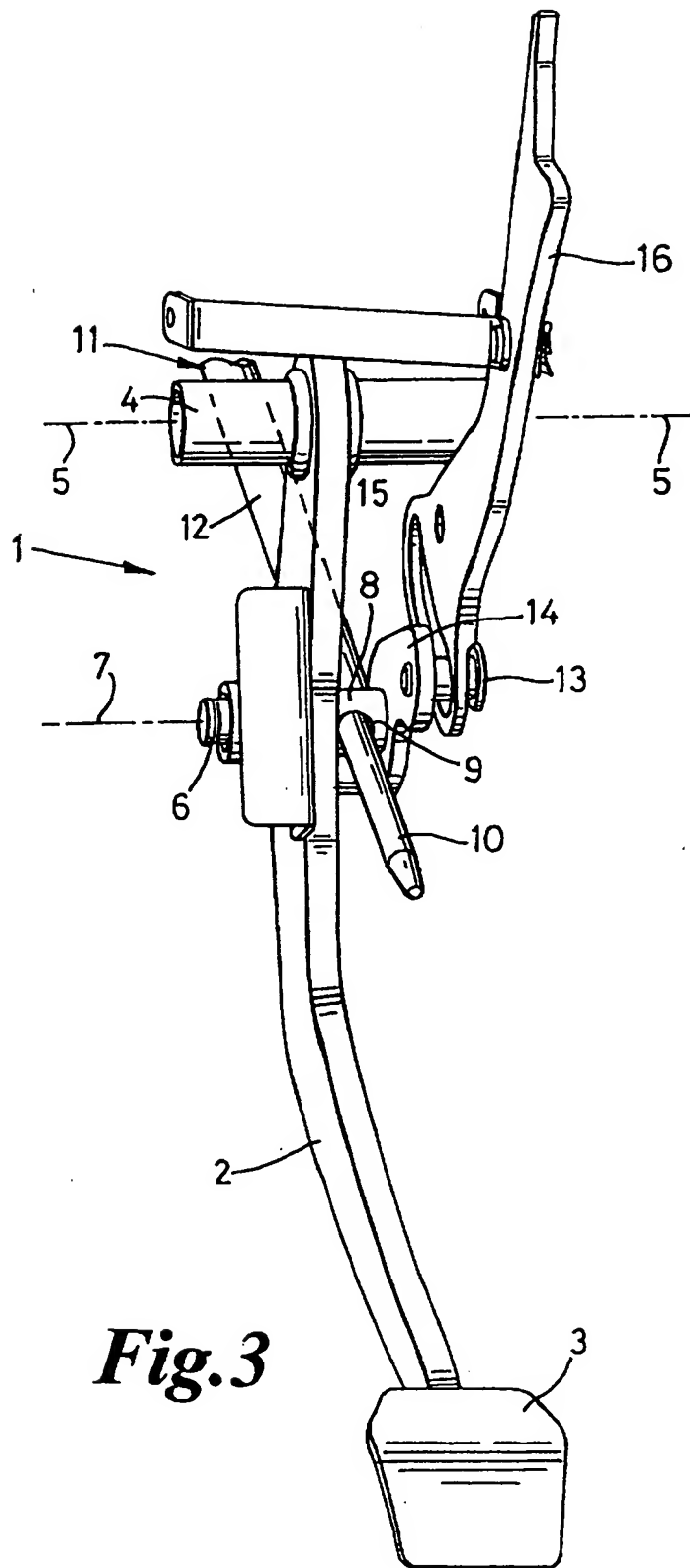
push rod (11); and

(iii) displacement means (16) is provided to cause partial rotation of the rotary member (14) upon a frontal impact of sufficient magnitude, to apply a bending moment to the push rod (11) to snap the push rod at its zone of weakness (W), thereby disconnecting the push rod (11) from the pedal to permit free pedal movement, and hence to permit pedal retraction away from the feet of the driver.

2. An arrangement as claimed in Claim 1, **characterised in that** the push rod (11) comprises a main length (12) of a first diameter, and an integral, second length (10) of reduced diameter, with the zone of weakness (W) provided at the transition between the two diameters.
3. An arrangement as claimed in Claim 2, **characterised in that** both the main length (12), and the second length (10), are of circular section.
4. An arrangement as claimed in any preceding Claim, **characterised in that** the rotary member (6) has a through hole (9) through which the reduced diameter second length (10) passes.
5. An arrangement as claimed in Claim 4, **characterised in that** the through hole (9) of the rotary member (6) is a circular hole.
6. An arrangement as claimed in any preceding Claim, **characterised in that** in a first embodiment, the rotary member (6) is rotated, by positional displacement of component mass (such as the engine/transmission package) that, in a frontal crash situation of sufficient magnitude, is subject to relatively rearwards movement.
7. An arrangement as claimed in any one of Claims 1 to 6, **characterised in that**, in a second embodiment, the rotary member (6) is rotated, in a frontal crash situation of sufficient magnitude, as a result of a component engaging the conventionally provided cross-vehicle beam.
8. A motor vehicle comprising an arrangement as defined in any one of Claims 1 to 6, or 1 to 7.
9. A motor vehicle having a front engine/transmission and a brake servo booster, comprising an arrangement as defined in any one of Claims 1 to 6, or 1 to 7.







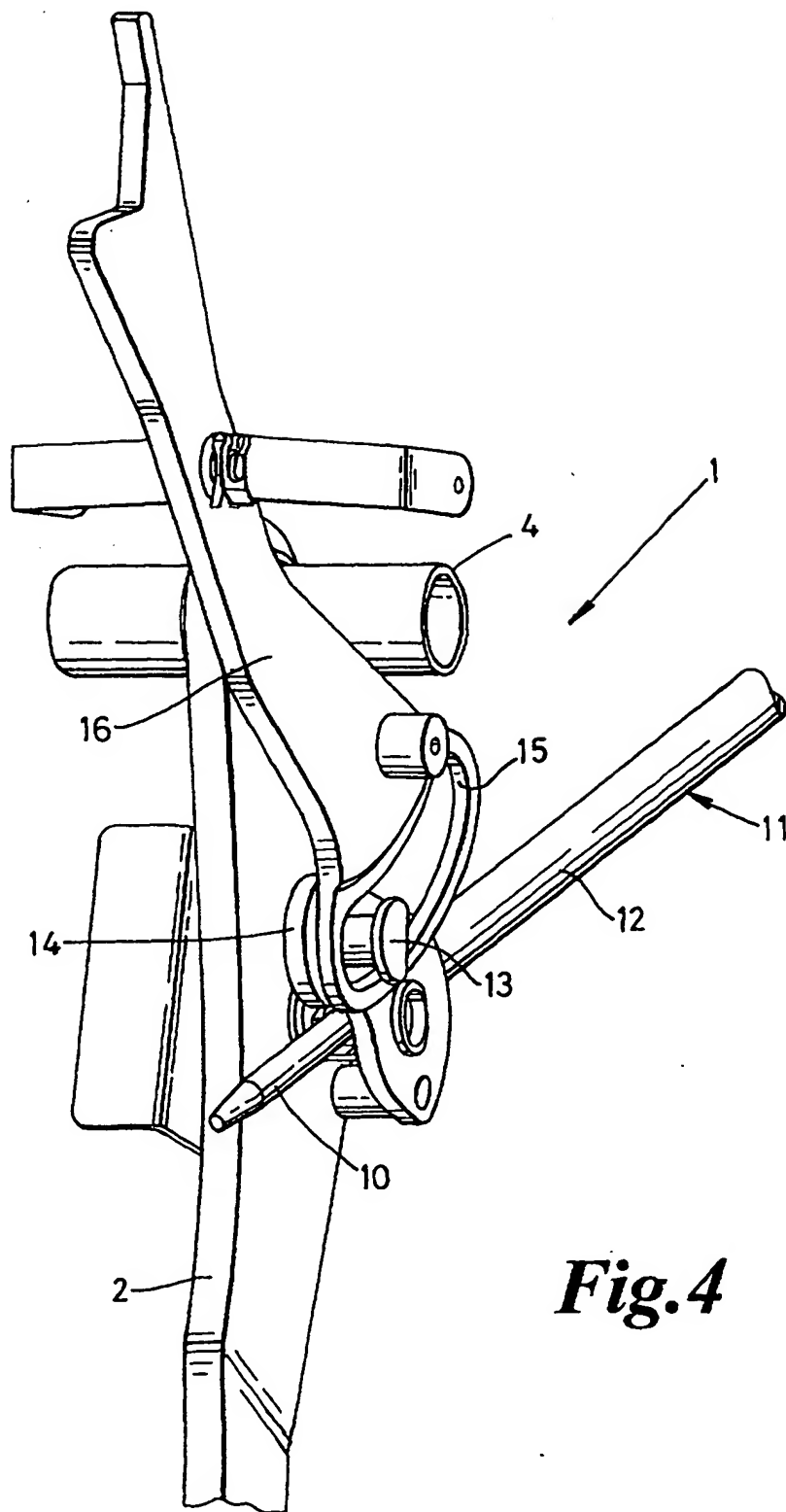


Fig.4